REMARKS

Claim 16 is amended. Claim 21 is cancelled. Claims 9, 14-16 and 47-49 are pending in the application.

Claims 9, 14-16, 21 and 48-49 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over a combination of Wolf "Silicon Processing for the VLSI Era" pp. 40, 52-55 and 555-557; Ding, U.S. Patent No. 5,814,563; JP 2000-349071; Sugishima, U.S. Patent No. 4,352,724; and either Lyons, U.S. Patent No. 5,930,645 or May, U.S. Patent No. 5,943,585. The Examiner is reminded by direction to MPEP § 2143 that a proper obviousness rejection has the following three requirements: 1) there must be some suggestion or motivation to modify or combine reference teachings; 2) there must be a reasonable expectation of success; and 3) the combined references must teach or suggest all of the claim limitations. In order to establish a *prima facie* case of obviousness, the burden of which is upon the Examiner, each of these three factors must be shown. Claims 9, 14-16 and 48-49 are allowable over the cited combinations of Wolf, Ding, JP '071, Sugishima, Lyons and May for at least the reason that the references, individually or as combined, fail to disclose or suggest each and every element in any of the claims, and fail to provide a reasonable expectation of achieving the claimed invention. Accordingly, a *prima facie* case of obviousness has not been established.

Independent claim 16 recites etching an opening through a silicon nitride layer, through a layer of oxide material, and into a semiconductive material using a single etch chemistry produced by generating plasma from a processing gas consisting of ammonia and at least one fluorocarbon selected from the recited group. In order to establish a *prima facie* case of obviousness with respect to independent claim 16, the Examiner must show

that the cited references disclose or suggest the recited generating a plasma from a processing gas consisting of ammonia and at least one fluorocarbon selected from the recited group. The Examiner must additionally show that the references suggest the recited utilizing this single etch chemistry to etch an opening through a silicon nitride layer, through a layer of oxide material and into a semiconductive material through an opening in a mask. It must also be established that the references provide a basis for a reasonable expectation of achieving the recited etching an opening through a silicon nitride layer, through a layer of oxide material and into a semiconductive material using the single etch chemistry recited.

As set forth in applicant's previous response, the combination of references relied upon by the Examiner fail to disclose or suggest the recited generating a plasma from a processing gas which consists of ammonia and at least one fluorocarbon selected from the recited group. Wolf discloses different etch chemistries utilized for silicon oxide layers, silicon nitride layers and silicon layers. In the present Action the Examiner indicates reliance on Wolf as disclosing using a dry etch of CF_4 gas. As acknowledged by the Examiner at page 2 of the present Action, Wolf does not teach or suggest the recited ammonia or the recited etching through silicon nitride layer oxide material and into a semiconductive material using a single etch chemistry.

Lyons, at column 6, lines 42-49, indicates etching a trench into substrate 21 through silicon oxide or silicon oxynitride layer 24, through amorphous silicon or polysilicon layer 23 and through pad oxide 22. The Examiner states at pages 9-10 of the present Action, that since the claims encompass layers comprising silicon nitride, Lyons reads on the claims. Without admission as to the propriety of the Examiner's rejection, claim 16 is amended to

recite a silicon nitride layer. The disclosure by Lyons of etching through an silicon oxide or silicon oxynitride layer, through an amorphous silicon or polysilicon layer, through pad oxide, and into a substrate, does not teach or suggest the claim 16 recited etching an opening through a silicon nitride layer, through an oxide material and into a semiconductive material. Further, the Lyons general disclosure of removal of materials by etching does not disclose or suggest the recited utilization of the single etch chemistry for etching the opening.

The Examiner indicates at page 3 of the present Action, that May is relied upon as teaching etching of the nitride layer, silicon oxide layer and substrate in a single dry plasma etch and indicates that "a dry plasma etch would include the group of fluorocarbons". Applicant notes however that May does not disclose or suggest any particular etch chemistry and therefore does not disclose or suggest any of the recited group of fluorocarbons. Since the Examiner's statement regarding the dry plasma etch "would include the group of fluorocarbons" is not supported by any reference, such statement is unfounded. The Examiner further indicates at page 10 of the present Action, that the May disclosure suggests a single etch chemistry because, as stated by the Examiner, "May teaches etching in "a dry plasma etching step"". The Examiner is mistaken.

Applicant notes that May specifically states utilizing "e.g., a dry, plasma etch technique" to etch a portion of nitride layer 54, oxide layer 52 and substrate 50 not covered by a photoresist layer. The suggesting of a dry plasma etch technique does not fairly suggest a single etch chemistry or in any way suggest the claim 16 recited single etch chemistry produced by generating a plasma from a processing gas consisting of ammonia and at least one fluorocarbon selected from the recited group.

In combination, the Wolf disclosure of various etch conditions for silicon oxide layers, silicon nitride layers and silicon layers; the forming an opening through a nitride layer an oxide layer and into a substrate utilizing dry plasma etch methodology as disclosed by May; and removal of a portion of an oxide layer, an amorphous silicon layer, a pad oxide layer, and substrate material by etching as disclosed by Lyons, do not teach or suggest the specifically recited utilization of a single etch chemistry to etch an opening through silicon nitride, through silicon oxide and into a semiconductive material as suggested by the Examiner. Further, the Examiner does not establish how the combination of Wolf, Lyons and May provides a reasonable expectation of achieving the recited forming an opening through a nitride layer, an oxide layer and into a substrate material utilizing a single etch chemistry.

With respect to the claim 16 recited single etch chemistry produced by generating a plasma from a processing gas consisting of ammonia and at least one fluorocarbon selected from the recited group, the Examiner indicates reliance upon Ding. The Examiner further indicates at page 11 of the present Action, that the claims do not preclude additional gasses such as a carbon-oxygen gas. Applicant notes that claim 16 specifically recites a single etch chemistry produced by generating plasma from a processing gas which consists of ammonia and at least one fluorocarbon selected from the recited group. Accordingly, gasses such as carbon-oxygen are precluded from the recited processing gas consisting of ammonia and at least one fluorocarbon.

Ding discloses methods of etching a dielectric layer comprising silicon oxide or phosphosilicate glass (col. 3, ll. 54-61). Ding further discloses that the process gas includes a fluorohydrocarbon gas, an ammonia generating gas and a carbon-oxygen gas.

Ding specifically indicates that each of these three components are present in the process gas utilized (with an additional inert gas being optional; col. 5, ll. 45-57). The use of an etch chemistry which includes a fluorohydrocarbon and ammonia generating gas and a carbon-oxygen gas as disclosed by Ding, does not disclose or suggest the claim 16 recited plasma generated from a processing gas which consists of ammonia and at least one fluorocarbon selected from the recited group (none of which are fluorohydrocarbons). Nor does the Ding disclosure of using a processing gas which includes fluorohydrocarbon ammonia generating gas and a carbon oxygen gas to etch a layer of silicon oxide or BPSG contribute toward providing a basis for a reasonable expectation of achieving the claim 16 recited etching through silicon nitride, silicon oxide and substrate material using a single etch chemistry produced by generating plasma from a processing gas consisting of ammonia and at least one fluorocarbon selected from the recited group.

Wolf, Lyons and May, considered individually or in combination, fail to disclose or suggest the claim 16 recited etching an opening through a silicon nitride layer, through a layer of oxide material and into a semiconductive material using a single etch chemistry. Ding fails to disclose or suggest the recited single etch chemistry produced by generating a plasma from processing gas consisting of ammonia and at least one fluorocarbon as suggested by the Examiner. Accordingly, the combination of Wolf, Lyons, May and Ding fails to disclose or suggest the claim 16 recited etching an opening through silicon nitride, through silicon oxide and into a semiconductive material using the single etch chemistry recited.

With respect to Sugishima, the Examiner indicates reliance upon column 5, lines 52-59 which discloses isotropic etching of various materials including silicon nitride materials,

silicon oxide materials and polysilicon materials. Applicant notes however that claim 16 specifically recites the etching being substantially anisotropic relative to the silicon nitride comprising layer. Accordingly, the various etch chemistries which can be utilized for isotropic etching as disclosed by Sugishima, do not contribute toward suggesting the claim 16 recited use of a single etch chemistry to etch an opening through silicon nitride, through oxide material and into a semiconductor substrate where the etching occurs substantially anisotropically relative to the nitride comprising layer. Nor does the Sugishima disclosure contribute toward suggesting the recited single etch chemistry.

The Examiner indicates at page 7 of the present Action, that JP '071 is relied upon as showing various fluorocarbons (CF_4 and C_5F_8) in combination with nitrogen, and optionally CO_2. However, as combined with Ding and Sugishima, the combination of fluorocarbons with a nitrogen source as disclosed by JP '071 does not contribute to the claim 16 recited single etch chemistry produced by generating a plasma from a processing gas consisting of ammonia and at least one fluorocarbon selected from the recited group.

As discussed above the combination of Wolf, Lyons and May fails to disclose or suggest utilization of a single etch chemistry for which they are relied upon by the Examiner. As additionally discussed above, the combination of Ding, Sugishima and JP '071 fail to disclose or suggest the recited single etch chemistry for which they are relied upon by the Examiner. In combination, Wolf, Ding, JP '071, Sugishima, Lyons and May fail to disclose or suggest the claim 16 recited etching an opening through a silicon nitride layer, through an oxide material and into a semiconductive material using a single etch chemistry produced by generating a plasma from a processing gas consisting of ammonia and at least one fluorocarbon selected from the recited group. Further, the combination of

Wolf, Ding, JP '071, Sugishima, Lyons and May fail to provide a basis for a reasonable expectation of successfully achieving the recited etching of an opening through a silicon nitride layer, through a layer of oxide material and into a semiconductive material using the recited single etch chemistry. Accordingly, a *prima facie* case of obviousness has not been established relative to claim 16 and such is allowable over the relied upon combination of Wolf, Ding, JP '071, Sugishima, Lyons and May.

Dependent claim 21 is cancelled. Dependent claims 9, 14, 15, 48 and 49 are allowable over the cited combination of Wolf, Ding, JP '071, Sugishima, Lyons and May for at least the reason that they depend from allowable base claim 16.

Claim 47 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over a combination of Wolf, Ding, JP '071, Sugishima, Lyons or May, as further combined with Lucent Technologies. As indicated by the Examiner at page 11 of the present Action, Lucent Technologies is relied upon as disclosing a particular photoresist and is not relied upon as contributing to teaching of a processing gas. Nor does Lucent Technologies contribute toward suggesting any of the other features discussed above which the combination of Wolf, Ding, JP '071, Sugishima, Lyons and May fails to disclose or suggest. Accordingly, independent claim 16 is not rendered obvious by Lucent Technologies in combination with Wolf, Ding, JP '071, Sugishima, Lyons and May. Dependent claim 47 is allowable over Wolf, Ding, JP '071, Sugishima, Lyons, May and Lucent Technologies for at least the reason that it depends from allowable base claim 16.

At various places throughout the present Action, the Examiner sets forth rejections relative to claims 8, 10, 19 and 52. Each of claims 8, 10, 19 and 52 were cancelled in previous responses and are no longer pending in the application. The present rejection of

such claims is therefore not further addressed.

For the reasons discussed above, claims 9, 14-16 and 47-49 are allowable. Accordingly, applicant respectfully requests formal allowance of such pending claims in the Examiner's next action.

Respectfully submitted,

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